September 2013 flood and High Park burn in the South Fork Cache la Poudre River near Fort Collins, CO

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Abstract. The September 2013 flood along the Front Range of Colorado caused a number of significant impacts to the physical structure of steep, mountain stream channels, including substantial aggradation and/or scour, bank erosion and channel avulsion, changes in the composition of stream beds, destruction of riparian vegetation, and the introduction of debris (natural and anthropogenic), among other impacts. In some areas burned previously by wildfires (e.g., High Park burn), flood and sedimentation (i.e., landslides) effects may have been exacerbated in the altered and sensitive landscape, although this relationship is tenuous. In this presentation, we present data on discharge, sediment loads (bedload and suspended sediment), turbidity, and rainfall collected on the South Fork Cache la Poudre before and after the area was burned by the High Park fire. Fortuitously, some of the instrumentation remained in place and collected data during the September 2013 flood. About 140 mm (5.5 in) of rainfall were recorded between 9/10 and 9/14, when the tipping bucket rain gage lost contact with the datalogger. Initial estimates of peak discharge on 9/13 (based on stage from a pressure transducer) are on the order of 31 cms (1100 cfs), which is greater than the calculated 100-year flood (bankfull at this site is about 9.6 cms (340 cfs). Flood recession was slow and flows were not contained within banks until 9/19, and pre-flood baseflow levels were not reached until mid-November. Estimates of suspended sediment concentrations (based on turbidity measurements) were between 2000 to 10,000 mg L^{-1} during the flood. Surveys of cross-sections and floodlines indicate that flows were between 0.3 and 1.0 m (1.0 to 3.2 ft) above the current bank level and that 0.5 to 0.9 m (1.5 to 3 ft) of scour or aggradation occurred in some parts of the channel. Although no post-flood grain size assessment could be made, visually, the channel appears to have changed from a very coarse cobble bed to a coarse gravel and cobble surface. On-going work in the spring of 2014 will continue to evaluate changes in bedload and suspended sediment loads following this substantial series of disturbances.